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April 1924.

THE VETERINARY JOURNAL

A Monthly Review of Veterinary Science.

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Sub-Editor:
GLADSTONE MAYALL, M.R.C.V.S.

APRIL, 1924.

Editorial

STATE SERVICES AND SALARIES.

On numerous occasions we have drawn the attention, in the editorial columns of the Veterinary Journal, of our younger graduates to the underpaid positions which are offered to them should they choose to enter the Government Service in this country and become whole-time Veterinary Officials, and the subject has also received the serious consideration of the Council of the National Veterinary Medical Association, without, however, up to the present, in so far as the most important State appointment of all is concerned, very pronounced material benefit.

We are glad to see that prominent attention has recently been given to it in the editorial columns of our contemporary, the *Veterinary Record*, and we draw the attention of our readers to what is written in the issue of March 8th. We confirm, to quote from the editorial in question, that "there is an abundance of evidence in our daily correspondence which shows unmistakably the feeling of discontent throughout the profession with the terms of service which are imposed upon those of our members who hold State appointments, and we are satisfied that there are injustices which have to be tolerated which would not be borne by a private individual who is a free agent." We draw the attention of our younger graduates to the quotation, "it must be remembered that a State servant or Civil servant cannot express his grievances in the Press; he must communicate all he has to say through the proper channels, and he is left entirely in the hands of the head of his department." We agree emphatically, too, from our own experience of correspondence with veterinarians overseas,

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" that the basis of most of the low salaries paid and the poor conditions of service is to be found at home, and that before these Colonial positions can be improved we must set our home service in order." It is, unfortunately, only too true that " the miserable pay and vexatious conditions of service in the Ministry of Agriculture, instead of making its service the premier service in the State, has come to be regarded, as far as veterinary appointments are concerned, as a disgrace to a great country whose chief asset is agriculture and the breeding of stock."

The subject has been again recently alluded to in the Presidential address of Mr. E. P. Edwards before the North Wales Branch of the National Veterinary Association, and this gentleman also brought up the question of County Council Inspectorship remuneration and the absurdly inadequate fees offered to members of the profession when called upon to give expert evidence in the witness-box.

It is another instance of our want of uniform loyalty to ourselves as embodied in the parent body, the National Association, and to our motto, " Vis Unita Fortior." As soon as we can make all our members realise the meaning of this motto and act up to it, we shall have no difficulty whatever in commanding what we are continually clamouring for, viz., professional recognition and a just remuneration.

Further comment is scarcely necessary, the quotations explain themselves and confirm what has already been stated on numerous occasions at veterinary meetings and in the editorial columns of the VETERINARY JOURNAL during the past few years. Our younger graduates who accept these terms of service have only themselves to blame, and if they would but put up a firm front and boycott all positions which do not offer an adequate remunerative prospect at the time and in future years, there could be no alternative but for our Government Service to offer decent emoluments which would make the service one which our best men would seek and in which they would endeavour to remain.

UNIVERSITY RESEARCH COLLABORATION.

THE new scheme, affiliated to the Ministry of Agriculture, by which three new Veterinary Research posts connected with the Universities of North and South Wales, and the Armstrong College, Durham, respectively, have been established and filled by members of our profession, has added increased opportunities for us as a profession to illustrate our worth; and we can rest assured that although they are only guaranteed for three years as a preliminary trial, their value to the agricultural community will be so established at the end of that time that further funds will be found to make their

establishment a permanency. The eyes of the whole profession are upon the three successful candidates, and their respective responsibilities are therefore proportionately great.

The desire on the part of the University authorities for a fair start, and to work amicably with the general practitioner, was especially well illustrated at the March Meeting of the North Wales Branch of the National Veterinary Association, when Professor White, of the Department of Agriculture, of University College, Bangor, had a heart-to-heart talk with the members as to their suggestions for the best method of carrying out the scheme under which the recently appointed Veterinary Advisory Officer (Mr. R. F. Montgomerie, B.Sc., M.R.C.V.S.) should carry out his duties. As a result of this numerous little troubles were cleared out of the way and a starting scheme was evolved which gave satisfaction to every one present. Professor White particularly made it clear that professional etiquette would be scrupulously adhered to in regard to the position of the practitioner and his client and the Research Officer. In all these posts, if the right men are appointed, the result upon the advancement of the profession in the fight against disease cannot help but be for good; but they must not forget that without the collaboration of the general practitioner they can never make progress. The general practitioner is the Alpha and the Omega, for it is he who indicates to the laboratory worker where the need for research lies in the first instance; and it is to him that the laboratory worker is bound to turn for the ultimate testing or application of his theories for the cure or prevention of disease.

THE DISTEMPER RESEARCH FUND.

THE Second Report of the Distemper Research Committee has now been submitted, through the Field Distemper Council, to the subscribers. In it is given a *résumé* of what has been done during the past six months. As will be remembered, the matter was placed in the hands of the Medical Research Council, whose experts, both medical and veterinary, are each doing their respective parts. The designing of the special kennels and their equipment, together with the management of the dogs for the necessary experimental work, have been in the hands of Prof. Buxton, M.A., F.R.C.V.S., D.V.H., and Major Dunkin, M.R.C.V.S., D.V.H. Bacteriological studies have been made and reported upon by Mr. R. E. Glover, M.R.C.V.S., whilst the special studies of the filterable viruses have been entrusted to Drs. Gye and Laidlow, with the co-operation of Mr. Dobell, F.R.S., and Mr. J. E. Barnard. The statistical portion is entrusted to Dr. Brownlee, of the Staff of the Medical Research Council, and Major Greenwood, of the Ministry of Health. The chairmanship of the

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Scientific Committee, owing to the resignation of Lieut.-General Sir Wm. Leishman, K.C.M.G., F.R.S., is now given to Prof. C. J. Martin, M.D., F.R.S., Director of the Lister Institute. The other members of the Committee are Prof. Buxton, M.A., F.R.C.V.S., D.V.H., Professor of Animal Pathology in the University of Cambridge, Capt. S. R. Douglas, F.R.S., Director of the Department of Experimental Pathology, National Institute of Medical Research, and Prof. F. Hobday, C.M.G., F.R.C.V.S.

With an investigation of this kind it is too early to expect great things, but it will be seen that the combination of medical and veterinary workers is an efficient and powerful one, and they may rest assured that the veterinary profession as a body are taking the greatest interest in what they are doing and are wishing them every success in their investigation.

PROGRAMME OF THE SECOND INTERNATIONAL CONGRESS OF COMPARATIVE PATHOLOGY.

THE Second International Congress of Comparative Pathology will be held in ROME between April 27 and May 4, 1924, under the Presidency of Professor Perroncito, Professor of Animal Pathology in the University of Turin. In the Calendar which has been issued there are some eighty-five headings of subjects to be dealt with, and these include papers and discussions on the following:

Gland Grafting and the Endocrine Functions of Glands; Experimental Nerve Grafting; The Tenacity of Life of Animal and Vegetable Parasites; Cancer Research; Diseases of Nutrition; Diseases due to Filterable Viruses; Foot-and-Mouth Disease; Rinderpest; Chicken Cholera; Bee Disease; Silkworm Disease; Bacteriofages; Animal and Vegetable Tumours; Piroplasmosis and Anaplasmosis; The Life History of Numerous Parasitic Worms; Mange; Arteriosclerosis of Man and Animals; Swine Fever; Diabetes; Rabies; Tuberculosis; Ankylostomiasis; Cocci liosis; Leucemia; Influenza in Man and Animals; Parasites of Fishes and Shell Fish; Anthrax, Blackleg, Botulism; Abortion; Syphilis in the Rabbit; Sleeping Sickness; Glanders; Actinomycosis; Echinococcus; Bilharziosis; Plague; Animal Asthmas—and many other things which have relations to diseases of interest to men and animals.

The readers of papers and openers of discussions include many well-known names amongst pathologists on the Continent and in America, and further details can be obtained on application to Frederick Hobday, Secretary of the British Veterinary Section, 165, Church Street, Kensington, London, W.

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General Articles

THE PHYSIOLOGICAL ACTION OF DYES.

By G. W. CLOUGH, D.Sc.,
Professor of Chemistry and Toxicology, Royal Veterinary College, London.

Dyes are now used for colouring cotton, wool, silk, hair, leather, furs, feathers, foods, beverages, medicine, and other materials. They are frequently employed in histology and bacteriology as stains for microscopical preparations, in medicine as antiseptics and remedies, and in photography various dyes are used for sensitising photographic plates. Some of these applications may be of sufficient interest to the veterinarian to justify the presentation of a short account of the physiological properties of some dyes. The veterinary analyst is occasionally required to decide whether or no the hair of a dog or a horse has been dyed, and to give an opinion concerning the effect of a given dye on an animal's skin. In this connection Mr. G. Yates, F.R.C.V.S., recently made an inquiry regarding the obliteration of pigmentation defects in dogs by the application of dyes, and asked if the dyes often induced very troublesome skin eruptions (*Veterinary Record*, 1922, p. 932). There is no doubt that animals are sometimes "faked" for purposes of sale or show by the application of dyes, and horses have sometimes been treated with dyes for ceremonial occasions.

The Relation between Chemical Constitution and Physiological Action.

Chemical analysis and synthesis have revealed that the atoms of the constituent elements of organic compounds are bound together in a definite manner, and it is possible to obtain a picture of the structure of a molecule of a compound. The term "chemical constitution" refers to the arrangement of the atoms in a molecule, and is indicated by the "constitutional formula" of a compound. The term "physiological action" has no simple meaning, but includes any action on the living organism. For example, the bactericidal action of phenol, the hypnotic properties of veronal and the local anæsthetic action of cocaine are entirely different actions; moreover, the same superficial signs of physiological action, such as purgation, may be due to different causes. A relation between the chemical constitution of many compounds and a definite physiological action they exert has been established. Notwithstanding the fact that comparatively little research has been prosecuted in this field, we are justified in assuming that there is some relation between the chemical constitution of a dye and its action on an organism.

The Chemical Constitution of Dyes.

The most satisfactory classification of dyes is based on the chemical constitution of these compounds. Organic compounds are usually colourless or white, but many possess an intense and brilliant colour. Colour depends on the structure of the molecule, and the colour of organic compounds is attributed to the presence of certain atomic groupings in the molecules of these compounds. These special groups are called chromophores. But a coloured substance is not necessarily a dyestuff. Dyes must possess an affinity for textile fibres, and are of the nature of salts. Some are produced by the combination of an organic base with an acid such as hydrochloric acid; others consist of a coloured organic acid in combination with a base such as soda. The former are called *basic dyes*, the latter are *acid dyes*. The basic or acidic character is due to the introduction of certain salt-forming groups called auxochromes into the molecules of the coloured compounds. The chief of these auxochromes present in acid dyes are the groups hydroxyl (OH), sulphonic acid (SO_3H), and carboxyl (CO_2H), whilst those present in basic dyes are amidogen (NH_2) and groups similar to this.

These salt-forming groups enable the dye to be held fast by the textile fibre. Dyestuffs are usually classified according to the chromophore present in the substance. The simplest chromophores are the nitro- (NO_2), nitroso- (NO) and azo- (N = N) groups present in nitro-, nitroso- and azo-dyes respectively.

The Physiological Action of Dyes.

The organic dyestuffs are important not only on account of their use in therapeutics, but also in connection with the development of theories concerning the mechanism of the action of drugs. Ehrlich has assumed that the selective action of a compound for certain cells depends on the coming together of particular groups in the molecule in some sort of chemical union with the cell substance. These groups serve to "anchor" the compound to the tissues. A dye must contain a chromophore and an auxochrome; similarly a drug must contain an active group, the "pharmacophore," and also an "anchoring" group. The fibres of animal tissue may withdraw a toxic compound from solution and fix it, just as wool will withdraw the dye picric acid from an aqueous solution. These phenomena may be compared with the action of ether, which will extract a dye from an aqueous solution if the dye is more soluble in ether than in water. But if a sulphonic acid group is introduced into the dye, the solubility in water is so much increased that the dye cannot be extracted with ether. Similarly all dyes capable of dyeing nerve cells lose this property

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if a sulphonic acid group is introduced into the molecule. It thus appears that there are certain substances in the nerve cells which behave like ether does in the ether-extraction process. It will be seen in the sequel that basic dyes are frequently poisonous, but acid dyes are usually harmless.

Many substances (antiseptics) inhibit the growth of bacteria, and a number of these also possess the property of killing bacteria (disinfectants). Experiments have recently been made with the view of discovering substances which differentiate between the protoplasm of the host and that of its invading microbes. Different textile fibres frequently show different affinities for a given dye, and different forms of protoplasm apparently differ in their affinities for some dyes. The antiseptic dyes (the flavines) have thus been discovered; they exert a powerful germicidal action in concentrations which show little deleterious effect on phagocytosis. Acriflavine, a dye formerly used for trypanosomiasis, was shown during the war to possess very remarkable antiseptic properties, and was extensively used for the treatment of wounds. It was subsequently found that the cheaper compound Proflavine was practically as efficient. Other dyes possessing bactericidal action are Malachite Green, Brilliant Green, Crystal Violet, and Ethyl Violet. Methylene Blue is used for internal application as an analgesic agent; it has also been used as an injection owing to its rapid infiltration into the tissues of the nervous system and has been recommended for the treatment of malaria, cancer, dysentery, rheumatism, cystitis and nephritis.

Alizarine, which is present in Madder, is one of the very oldest dyes. It is a mordant dye, a dihydroxy-anthraquinone, and is now made synthetically. Some of the hydroxy-anthraquinones (but not alizarine) exert an aperient action, the purgative properties of senna, aloes, rheum and cascara being due to the presence of hydroxy-derivatives of anthraquinone in these drugs. The absorption of alizarine by the bones of animals is probably connected with the great tendency of alizarine to combine with certain metallic compounds to yield lakes. In this connection Bancroft describes an interesting incident (*Philosophy of Permanent Colours*, ii. 232): "The remarkable effect of madder in giving its red colour to the bones, but not to the soft parts of animals, with whose food it had been mixed, appears to have been observed in the sixteenth century, but it was quite forgotten until John Belchier, a surgeon, happened to dine with a calico printer in Surrey in 1736 and observed that the bones of some pork which made a part of the dinner were red. Upon expressing his surprise at the fact, he was told that the hog from which it was taken had been fed on bran after it had been employed in one of the operations of

calico printing, and had thereby imbibed the colouring matter from the madder roots. Mr. Belchier afterwards ascertained, by adding some powdered madder roots to the food of fowls, that a similar redness was thereby communicated to their bones, and he gave an account of his observations to the Royal Society."

The Toxicity of Some Dyes.

Before the discovery of synthetic dyes (1856) manufacturers of sweets frequently employed such toxic mineral colours as lead chromate, Prussian blue, red lead and vermilion. At the present time manganese brown, ultramarine blue and iron oxide brown are often used; these agents are insoluble and very indigestible, and may give rise to irritation in the alimentary canal. Comparatively large quantities of these pigments are required to give sufficient colour; for example, aniseed balls may contain as much as 8 grains of iron oxide brown per ounce. Vegetable dyes are harmless, and include litmus, indigo, sap green, gamboge, turmeric and saffron.

Many aniline dyes come on to the market in the form of double salts with zinc chloride; the commonest of these are Methylene Blue and Malachite Green. Such compounds are toxic owing to the zinc content. Some years ago dyes were sometimes contaminated with arsenic or copper, but to-day dyes are usually free from these metallic poisons. It must be borne in mind that there may be considerable differences in the effect of a given dye on a number of individuals, and the effect of a dye on the thickly-covered skin of a dog may be very different from that of the same material on the bare skin of a man. With the view of ascertaining the toxicity of some common aniline dyes, Cazeneuve and Lepine, in 1886, and Weyl (*Die Theerfarben*, 1889, Berlin) made a number of experiments on guinea pigs and dogs; no systematic research on this subject appears to have been carried out since that time.

Nitro and Nitroso Dyes.—Despite the fact that most dyes containing nitro- and nitroso-chromophores are acid dyes, they must be regarded as poisonous unless the effect of these groups is neutralised by the presence of sulphonic acid groups in the dyes. For example, picric acid was long ago shown to be poisonous; Victoria Orange (Saffron Substitute), though at one time used for colouring liqueurs, macaroni, etc., is extremely poisonous, and has led to fatal results. A woman died after taking internally 5 grams of this dye instead of saffron. The toxic dose for an animal is approximately $\frac{1}{3}$ grain per pound body-weight. Aurantia has a very poisonous action on the skin, gloves dyed with this substance causing inflammation on the hands of the wearer. Martius Yellow must be regarded as dangerous.

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Naphthol Yellow S is non-poisonous to dogs, and is used for colouring food, the presence of a sulphonic acid group causing a neutralisation of the toxic action. Some "egg powders" consist simply of rice flour coloured with a yellow dye.

Azo Dyes.—The chief basic dyes of this class are Aniline Yellow, Chrysoidine and Bismarck Brown. Although Weyl has reported that Chrysoidine is non-poisonous to dogs, it not infrequently affects workmen who handle this substance. A worker who had been shaking this dye through a sieve for four hours subsequently developed dermatitis; the body became covered with large blisters, and ultimately the skin peeled off from the whole body (*Vorhand. der Berl. Med. Gesell*, 1889, p. 163). Bismarck Brown is only slightly toxic. Among the acid dyes of the azo series, Metanil Yellow is poisonous, Orange II, though not very poisonous, is objectionable, and small amounts of Fast Yellow and Methyl Orange may cause serious digestive troubles. The United States Department of Agriculture permits the use of the azo dyes Amaranth, Ponceau 3 R, Orange I, and about half a dozen acid colours of other classes for colouring foods.

Azine Dyes.—The chief dyes containing the azine-chromophore are the basic dyes Mauveïne, Safranine, and Induline. Induline is soluble in spirit and in some oils; it can be sulphonated to yield a water-soluble acid dye, which, however, is not "oil soluble." Safranine is very poisonous; when injected hypodermically $\frac{1}{3}$ grain per pound body-weight is fatal to a dog. The toxic action of this dye was investigated by Weyl owing to the circumstance that a lady who had worn a garment, the lining of which was dyed with safranine, suffered from a curious skin eruption on the arms and neck (*Zeitsch. für Hygiene*, 1889, vii. 35). Spirit soluble induline (or acetin blue) is a dye closely allied in chemical constitution to safranine. An action recently tried in the King's Bench Division (Edwards *v.* B. C. Tipper & Sons) is of interest to the veterinarian. The plaintiff, a breeder and exhibitor of pigs, sought to recover damages for injury alleged to have been done to a boar through treating it with an oil known as "piggo" manufactured by the defendants, who represented that the oil would allay irritation of the skin, check vermin, and heal scratches, and that it was invaluable for giving a pig the best appearance at shows and markets. As a result of treatment, the plaintiff alleged that the boar was seriously injured, large blisters appearing, and a piece of the skin peeled off. Evidence was given that the mixture consisted of liquid paraffin, a little amyl acetate, and a basic aniline dye, spirit-soluble induline. Mr. Justice Swift, in giving judgment for the defendant, held that the "piggo" had been applied to the plaintiff's boar in excessive quantities, at too frequent intervals,

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and not in accordance with the instructions. This decision was subsequently set aside by the Court of Appeal, the plaintiff being awarded damages and costs.

The Acridine Dyes.—The parent compound of this series of dyes is acridine, which exerts a very irritating action on the mucous membrane and skin. Acridine hydrochloride and other fluorescent dyes can produce "photodynamic" actions in the animal organism. Animals that have been injected with this dye show different phenomena according to whether they are kept in the dark or exposed to light. They have a similar and injurious action on bacteria. The dye Phosphine has a toxic action on the lower animals in a dilution of 1 in 200,000. Acridine Red is somewhat toxic. The flavines belong to the acridine series.

Fur and Hair Dyes.—Fur dyes are sold under the names "ursol," "furol," "fantol," "fur base," etc. They consist of para-phenylene-diamine, para-amido-phenol, or similar compounds, which are not themselves dyes, but yield insoluble dyes on the mordanted furs after oxidation (development) with hydrogen peroxide. These insoluble dyes are quite harmless. If the furs are badly dyed, there may be unoxidised para-phenylene-diamine (which is toxic), or the very poisonous intermediate oxidation products, quinone-imides, on the furs. In dye houses where Ursol is used the workers are sometimes affected with eczema, asthma, gastric complaints, and inflammation of the eyes, due to the quinone-imides. In this country many cases of "fur dermatitis" have occurred; thus in the first quarter of 1922 there were thirty-three out-patients treated for fur dermatitis at St. Bartholomew's Hospital. The present writer has examined a number of furs alleged to have caused dermatitis, and on all of these there was a certain amount of loose colour extractable by water, and on some there were minute white crystals of an organic compound, presumably an intermediate oxidation product of the fur base. (Compare H. C. Semon, *Brit. Med. Journ.*, 1923, pp. 467, 613; A. C. Rombury, *ibid*, 1923, p. 1923; W. F. Castle, *ibid*, 1923, p. 534.)

Hair dyes frequently consist of para-phenylene-diamine, which is oxidised by hydrogen peroxide to an insoluble dye. It is therefore not surprising that cases of damage by these dyes are reported from time to time. The injury is doubtless due to the imperfect oxidation to quinoneimide. The company, Inecto, Limited, carried on the business of supplying a hair dye called Inecto Rapid, and it attained some notoriety from an action brought by Mrs. Rivette, who obtained judgment for £200 and costs for damage done to her hair by the use of the preparation (February 27, 1922). Inecto Rapid is a para-phenylene-diamine preparation.

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It may be mentioned that it has been reported that Dr. T. M. Legge in a lecture gave instances of poisoning by the important dye, Aniline Black (*Chemistry and Industry*, 1923, p. 301), but in the opinion of the present writer this surprising statement cannot be accepted without confirmation.

In conclusion, it may be recalled that some animals are capable of elaborating substances which have been used as dyes. For example, the famous Tyrian Purple was prepared from certain shellfish; whilst Kermes, Cochineal and Lac Dye consist of the dried bodies of certain insects. Indian Yellow (Piuri) is obtained from the urine of cows which have been fed on mango leaves; but the Indian Government have now forbidden cows to be fed on these leaves, as they are injurious to the animals.

PATHOLOGICAL STUDIES IN THE FOWL.

By B. F. KAUPP and R. S. DEARSTYNE,
From the Laboratory of Poultry Pathology, North Carolina Experiment Station.

Introduction.

Owing to the general lack of poultry pathological studies in veterinary literature, it has been the practice of this department, for many years, to periodically record some of its most interesting studies.

In this article there is recorded a case of impaction of the floating portion of the small intestine of a White Wyandotte hen, an extra abdominal testicle of a Single Comb White Leghorn cockerel, and pyæmia of a Barred Plymouth Rock cock.

Impaction of the Floating Portion of the Small Intestines of a White Wyandotte Hen.

By impaction is meant the accumulation in hard mass of food in such a manner as to obstruct the passageway of the intestine.

Impaction of the intestine is due to an obstruction of the bowel, thus preventing the passage of the normal bowel content. This condition is supposed to be rare in fowls, but has been observed. It may be due to masses of intestinal worms, especially the *Ascaris inflexa* and to tapeworms. A case was observed in which the fowl had eaten coarse hay, similar to Bermuda grass or prairie hay, and this had obstructed the gizzard and protruded out into the small intestine.* Large pebbles, pieces of rags, and feathers may likewise obstruct the intestine.

Canaries and other cage birds at times suffer from impaction caused by sluggish peristalsis due to the sedentary life or lack of

* B. F. Kaupp, *Poultry Diseases*, 3rd edition, p. 150. Alex. Eger Pub. Co., Chicago, Ill.

exercise, and heavy, indigestible foods, or the lack of grit. Impaction of the cæca due to improper feeding occurs.

The matting together of the vent fluff in diarrhœa of baby chicks may prevent defæcation.

Again, in fowls fed on too heavy fibre as an excess of oats may cause constipation, and even impaction.

Symptoms.—There may be depression of the bird, listlessness, loss of appetite, repeated straining, as though trying to pass droppings, small amounts of droppings passed at long intervals. Death may occur from necrosis of the wall at the point of obstruction and from exhaustion.

The following is an account of the case in a hen :—

Subject.—A White Wyandotte hen was sent to the Laboratory

FIG. 1.—Impaction of the Floating Portion of the Large Intestine of a Wyandotte Hen. (1) Impacted Portion; (2) Small Intestine, Normal Size.

from the Experiment Station poultry plant. The hen was in a very sick condition.

Symptoms.—Upon examination of the hen it was observed that the crop was in a state of impaction, being filled with a doughy pultaceous mass. The bird refused food, and stood drooped and listless, and died in a few hours.

Post-Mortem Findings.—The crop was filled with a sour-smelling semi-fluid mass. The balance of the organs were normal, except the floating portion of the small intestines. A portion of this part was impacted. The impacted portion contained a pultaceous mass, and was greatly distended, measuring 3·75 cm. in diameter, and 27 cm.

long. The diameter of a normal small intestine is about 0·5 cm.; the weight of the impacted portion was 205 grams. The total weight of the intestine was 265 grams.

Fig. 1 is a photograph of the impacted portion. At 1 is shown the impacted loop, and at 2 is shown the normal small intestines.

EXTRA ABDOMINAL TESTICLE IN A SINGLE COMB WHITE LEGHORN COCKEREL.

The testicles of the fowl are normally developed in the abdominal cavity just in front of the kidneys, where they always remain.* In the literature at hand we fail to find mention of extra-abdominal testicles in fowls, and for this reason we believe that this case will be of extraordinary interest.

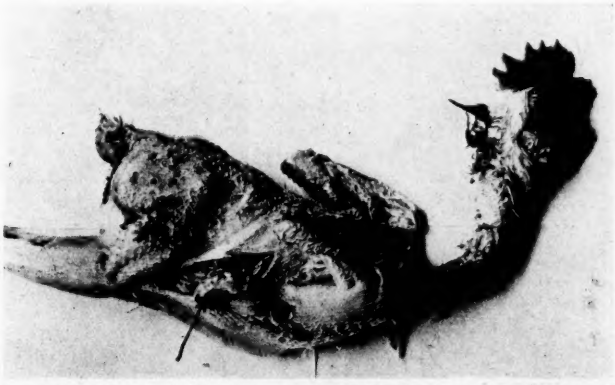

FIG. 2.—A Single Comb White Leghorn Cockerel with Right Testicle developed in the Right Flank, just under the Skin.

The following is an account of this case :—

Subject.—A Single Comb White Leghorn cockerel about three months old.

History.—This bird was reared on the College and Station poultry plant. It was fattened in student laboratory fattening work, killed, and picked by same. At the time of trussing an enlargement was noticed in the right flank just anterior to the knee or femero-tibial joint. This enlargement was about the size of a pecan nut, and was movable, and located just under the skin. Upon opening the skin and laying bare the object it was noticed to resemble in every respect a normal testicle. The vas deferens followed a line into the abdominal cavity. Upon opening the abdominal cavity the right testicle was absent. Section of the testicle revealed normal testicular substance.

The accompanying photograph shown in Fig. 2 illustrates the case.

* B. F. KAUPP, *The Anatomy of the Domestic Fowl.* W. B. Saunders Co., 1918.

PYÆMIA OF A BARRED PLYMOUTH ROCK COCK.

Localised suppurations, and especially in the form of abscesses, are quite common, many of them having been reported from this laboratory.

In the fowls the majority of the pus cells, the polymorphonuclear leucocytes,* are of the eosinophile rod and eosinophile granular type. For this reason the sections of abscess stained with the hæmatoxylon-eosin stain, the pus cells—formerly white blood cells—appear as masses of eosinophiles.

An abscess is a collection of pus in a cavity, result of a morbid

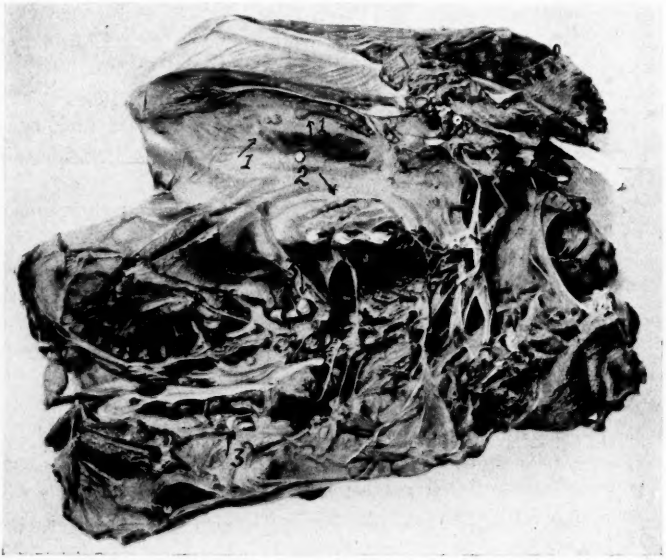

FIG. 3.—Pyæmia of a Barred Plymouth Rock Hen. (1 and 2) Abscess of the Sternum and Ribs; (3) Abscess of the Pelvic Region.

process. An acute abscess is one following an acute or violent inflammation. A "cold" abscess is the result of a chronic inflammation. In "cold" abscesses a fibrous capsule develops around the mass of accumulating pus.

The content of the abscess, pus, in the fowl is of a yellowish-white colour, opaque, inodorous, and of a cheesy nature. Normal pus of the fowl contains pus cells—dead or dying leucocytes—and practically on liquor puris. In the infective suppurations due to germs,

B. F. KAUPP. *The Anatomy of the Domestic Fowl.* W. B. Saunders Co., 1918.

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in the fowl, we have most often isolated the *Streptococcus pyogenes* and the *Staphylococcus pyogenes aureus*.

The following is a record of the study of a case of pyæmia in the fowl :—

History.—A two-year-old Barred Plymouth Rock cock, a member of the Station and College flock, died suddenly during an outbreak of fowl typhoid, but upon autopsy it was found that this was not the cause of the death of this bird.

Post-mortem Findings.—The carcass is emaciated, and the abdominal fat has disappeared. The organs are in a normal state, except the heart, kidneys, liver, adrenal glands, and the muscles and bones, such as the ribs, vertebræ, and pelvis.

The heart is studded with twenty white coloured tumour-like masses, varying in diameter from 2 to 10 mm.

The liver is studded with many small tumour-like masses. The kidneys are studded with twenty-four white coloured tumour-like masses, varying in size from 1 to 15 mm. in diameter. A tumour-like nodule involved the right adrenal gland.

Numerous tumour-like nodules, varying in size from 2 to 20 mm. in diameter, involved the abdominal, pelvic, and thoracic walls, including the obturator internus muscle, lumbo-sacral vertebræ, and the pelvic bones and ribs. In all, more than one hundred tumour-like nodules were observed.

Microscopic Findings.—Specimens from the kidney, heart, adrenal gland, liver, and muscles were hardened in formalin, imbedded in paraloid, sectioned and stained with hæmatoxylon and eosin, and clarified in beechwood creosote for study.

Heart.—In a study of the neoplasm from the outer wall of the heart there is observed masses of large polymorphonuclear cells with round eosinophilic granules. As the heart muscle is approached the cells pack in between the muscle fibres, widely separating them. These are typical pus cells, as described above, and the process is one of suppurative myocarditis. The cytoplasm of the cells in all parts have round eosinophilic granules. The nuclei in some cases appear horseshoe shaped, and in others with two or more knobs.

Liver.—The small tumours of the liver are made up of cells similar to those of the heart, with an occasional thrombocyte. These cells, in the newer invaded parts of the liver, push in and separate the columns of liver cells.

Kidneys.—There is both active and passive congestion present. The congestion, in parts, is intense. Cloudy swelling is present, as shown by the cloudy granular appearance of the cytoplasm of the parenchymatous cells. In some tubules the cells have left their seat

and are obliterating the lumen. Congestion of the glomerules is present. In portions near the tumour the lumeni are entirely obliterated, the nuclei breaking up, and the cells undergoing degeneration and death—necrosis. As in the heart, the supposed tumour is a mass of polymorphonuclear leucocytes, with round eosinophilic granules. In the renal tissue close to the tumourous mass the leucocytes are invading the kidney tissue forming columns between the tubules, the cells of which are disintegrating with nuclei breaking up and the tubule lumen obliterated. The condition is one of suppurative nephritis.

A tumour involving the adrenal gland was also studied. This is likewise a mass of polymorphonuclear leucocytes with round eosinophilic granules thoroughly studding the cell cytoplasm.

A tumour from the obturator muscle was also studied. This is composed of masses of cells similar to the above.

All of the tumour-like masses involving the heart, kidneys, adrenal gland, liver, ribs, pelvis, and other parts are composed of a cheesy material, and are small abscesses. Pyæmia is present.

SOME REMARKS ON THE URGENCY AND IMPORTANCE OF PRECAUTIONARY MEASURES AGAINST INFECTION BY ANIMALS, PERSONS, AND THINGS IN SUSPECTED FOOT-AND-MOUTH DISEASE.

By A. HOLMAN BERRY, F.R.C.V.S.,

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The essentials for ourselves, as veterinary surgeons, is to fully recognise our share of the responsibilities, our immediate duties, our thoroughness in carrying out the same, and to cultivate a deeper sense of the importance of precautionary measures to be enforced forthwith.

We should regard the disease most seriously, and should report speedily any suspicion which exists in order that those who from greater experience are more familiar with the lesions and better prepared, not only to give a definite opinion, but to enforce immediately preventive measures against the spread of disease from the premises, may have the earliest opportunity of doing so.

The chief hindrance lies in the fact that all are not fully alive to the extraordinary infectivity or contagiousness of the disease, the ease with which infection may be carried to and taken in by another susceptible animal many miles away, especially so when the clinical evidences of actual disease are least apparent to the eye.

Further, we fail to realise and appreciate the disastrous conse-

quences which may follow any delay, inaccuracy, neglect, carelessness, or indifference on the part of a single individual.

The ramifications of disease resulting from inaction may be beyond estimation, in view of the high degree of infectivity of the disease and the movement of animals, persons, and things, in the order stated, especially so when the movements have been made through markets and the transit by rail or water, etc.

Of course, the responsibilities for taking immediate action to prevent the spread of disease are not confined to ourselves, but to every person who owns, or has under his charge, or comes into contact with stock, as the farmer, butcher, dealer, auctioneer, etc., and their employees, all of whom have a more or less instinctive knowledge, through association with stocks, whether an animal is right or wrong, sick or well. Many have acted up to that knowledge (although not infrequently removing the good that is done with the one hand by the other, through lack of thought or fuller knowledge), whereas others, and often well-informed owners of stock, have, on the slightest rumour or suspicion of disease, been far more concerned in getting animals away, and thereby spreading infection, than by stopping movement and the spread of disease.

Information should be offered freely. This remark applies particularly to some owners and dealers who appear to have a peculiar delight in holding back important information from those entrusted with the inquiry, considering it is the official's task to worm it out of him —if he can—bit by bit. Such malpractice, needless to say, causes endless unnecessary labour, waste of time, and often further outbreaks of disease.

Unless and until dealers, farmers, and others realise it is, in part, their job to arrest infection, to prevent its spread, and to eradicate disease, serious results may follow any lack of ready assistance on their part during the initial stage of an outbreak.

As a starting-point, the one thing needful is the wholesome co-operation of all concerned to meet the urgency, as well as the demands of a suspected case of disease, and to render assistance both to the local and the central authorities who are experienced in the work and the duties involved, and are the bodies able to enforce the measures against spread of infection with all practicable speed by the issue of Orders and Regulations for prohibiting and controlling movement of animals, persons, and things locally and generally as the case may be.

The immediate preventive measures (against the spread of infection by animals, persons, and things) to adopt are on the lines suggested by the following remarks, the chief object of which will be to arrest the movement of animals, persons, and things off and on to the

premises, or when the movement of certain persons and things on and off the premises is unavoidable, the movement to be regulated and controlled by disinfection.

Personal disinfection and the wearing of overall clothing, boots, etc., is of foremost importance, which must include a careful attention to details in order to carry out the same in a thorough and efficient manner. It sets a good example, and leaves a good impression for those on the premises to follow which is often more effectual than mere words of advice. Special attention must be given to the finger-nails, undersurface of boots, removing all collected material which may have lodged in the instep.

The disinfection of all persons engaged on the farm at the time of the suspicion, the extent of disinfection depending upon the degree of contact with sick animals in particular, and the contact animals generally, but under all circumstances the hands and boots should be included.

Change of clothing or overall clothing for those in contact with the affected animals and their surroundings, including "contact" animals in same lot or building, etc.

The disinfection of persons who have been on the premises recently to the outbreak—say forty-eight hours before first sign of illness noticed.

The free use of disinfectants about the buildings and yards, on and around doors and gates, to which suspected animals have had access or persons in contact with suspected animals have been handling.

As far as possible, all persons on the premises to keep to themselves; visiting and visitors should be discontinued, including private premises, markets, shows, clubs, or other public places where animals or owners and workers among farm animals congregate.

No person working on the premises or in contact with the yards or buildings to enter the house or leave the premises without, on each occasion, disinfecting hands and boots, in order to avoid carrying infected material into the house by the back door to be picked up by others (womenfolk and children in particular) on their hands, boots, and clothing and carried away through the front door.

A bucket or other more suitable container partly filled with disinfecting fluid should be placed outside sheds, fields, or other places occupied by suspected or contact animals, and used on entering and leaving the particular shed, etc. Also one at the back door into the house. Shallow trays, containing hay or old sack saturated with disinfecting fluid placed at the back and front doors for the use of persons living on the premises, but not frequenting the actual yards and buildings, will serve the purpose required.

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Tradespeople, postmen, travellers, recorders, millers, etc., should be warned against coming into the yards, and whenever possible arrangements made for receiving the goods at the front door or gate, if not outside the premises altogether.

All visits by gelders, valuers, farriers, threshers, fishing, shooting, or other parties, vermin catchers, etc., should be immediately postponed.

Care needs to be exercised *re* contact with "contaminated" persons (handshaking) or things, as gates, half-doors, latches, upon which animals have salivated, or things which have been handled by persons in contact with suspected stock. Frequent disinfection after handling most things on the premises will be found advisable, including disinfection of thermometer and case, umbrella, stick, gloves, or other things. I might mention in this connection that care should be exercised in the dispatch of letters and parcels from the premises that the hands are cleansed and disinfected before writing or handling same. It will be of service to the veterinary surgeon and others to carry on his person while on the premises a cloth or swab dipped in strong disinfecting fluid for wiping hands, etc., from time to time.

Poultry, cats, dogs should be kept off the highway and the premises of other owners, and out of the fields, yards, and buildings where the suspected animals are confined. If the suspicions of disease are confirmed, immediate steps should be taken to confine them to buildings or spaces. Poultry should not be removed from the premises unless small dressed and devoid of *all* feathers, and the eggs should be washed in soap and water.

No vehicle (visiting) should be allowed on the premises, and no vehicle or horse should leave the premises unless really necessary and until the wheels and the floor of the vehicle have been disinfected, the horse's feet picked out, and the entire hoof disinfected.

Visits to the local smithy should be, if possible, postponed, and if urgent, only after a thorough disinfection of the horse's legs and feet has been carried out.

No foodstuffs or litter intended for the use of animals should be removed from the premises, and if possible no more than is actually needed for immediate consumption brought on to the premises. When this is so, the foodstuffs should be handled by "clean" persons, i.e. persons who have not been contaminated by contact with the virus, and stored away from access or contact with animals or contaminated material.

No milk from a diseased or suspected animal can be removed from the premises. Such milk should be boiled, or treated with disinfectant and afterwards buried.

If any doubt arises with regard to the removal from the premises

of the remainder of the milk, it could be converted into butter or cheese on the premises.

If necessary to remove milk churns or cans, they should be scalded on the inside and thoroughly cleansed and disinfected on the outside (special attention to bottoms) before leaving the premises.

Meal or grain bags should not leave the premises. All gates should be kept closed, and the entrance gate preferably locked.

If suspected animals are in a field, an attempt to isolate them from surrounding stock and pastures should be considered, and if at all possible carried out by confining the particular animal or lot of animals to the field or part of the field with the aid of posts and rails, or barbed wire.

Gates to the field should be fenced off on the inside with hurdles or post and wire, and any gaps in the fencing dealt with. A bucket or two of disinfecting fluid at the principal gates will be ready for immediate use as required.

When the field is large and animals are in surrounding fields, it will be advisable to arrange for a person on duty day or night to keep the animals away from the boundary fence, unless a temporary fence of posts and barbed wire can be fixed in position about six yards or more from the boundary fence.

Any stacks or roots in the field should be fenced off from access of animals by post and wire-fencing or hurdles. The movement of sheep can be limited and regulated by folding, and pigs should be penned up.

No animal, under the Order, is allowed on or off the premises. All recent movement on or off the premises (including movements for breeding purposes and stock brought back unsold) should be ascertained, and steps taken to warn and furnish the information to all concerned in order to isolate at once a possible source of infection on other premises and prevent a further spread of disease.

The isolation of the suspected animal or particular lot is not always practicable, and it may sometimes not be advisable to move one or more affected animals out of a particular lot from one building to another. The point will need a little consideration in the first place. When it is necessary, or the movement is decided upon, the vacated box or shed should be closed, or alternatively the stall or other place occupied by the suspected animal thoroughly sprayed and soaked with disinfectant, also the track traversed by the animal between points and buildings as far as is reasonable and practicable, especially so is this desirable if other persons and animals have access to the particular piece of roadway or track.

Disinfecting fluid should be placed at the entrance of the isolation

pen. The suspected animal should be under the attendance of one person only, who should not attend to other stocks, or the isolation pen should be well bedded down with suitable litter (preferably short), and arrangements made for the feeding and watering to be done just inside the doorway, which will obviate the necessity for anyone to enter the shed or come in contact with the suspected animal or its excretions for the time being.

Care should be taken to avoid contaminating foodstuffs on the premises by unnecessarily handling or walking over the same. If the suspected animal has recently been in a market, or conveyed by rail or water, the information should be acted upon at once, in order to get into touch with auctioneers, railway and shipping companies through the Constabulary Services at the earliest moment.

The assistance of the Constabulary Services in Great Britain is of the utmost importance. Apart from the valuable assistance rendered by the Chief Constables through the Superintendents and other officers of the district in the initial stage of an outbreak by multiple inquiries and prompt preventive measures against spread of disease, the actual good done by the police constable on duty at the entrance of the premises can never be fully realised except by the harm that may follow when his presence is withdrawn too early, or dispensed with at the critical stage of an outbreak.

Veterinary surgeons acting either in a private or official capacity would be advised not to give a decided negative opinion in a suspected case of disease by artificial light, but in the meantime to take every precaution against spread of any possible infection from the premises and wait for the morning.

In addition to the personal disinfection, it is advisable for the veterinary surgeon to disinfect the footmat or board of the car, and also the driving-wheel. After everything is completed, it will be necessary to avoid the owner or person in charge of sick animals contaminating the parts by leaning against the car or resting a hand on the driving-wheel during further conversation.

The veterinary surgeon acting as inspector to the local authority will also remember his power to put into operation Order No. 829, thereby arresting and prohibiting the movement of animals (cattle, sheep, goats, and swine, and other ruminating animals) within a radius to be decided upon by him, but usually not less than five miles from the place occupied by the suspected animal. The immediate enforcement of this Order by the local authorities concerned will have the desired effect of preventing the holding of markets within that area and of holding up all animals at markets or sales, or in the process of being trucked or actually trucked, awaiting removal from loading bank.

The above remarks in no way exhausts *all* there is to be said upon the subject of precautionary and preventive measures which are necessary to be observed if the best results are to be expected and the honour of our profession maintained. However, it is hoped that sufficient has been said to stimulate and suggest to the minds of busy practitioners their share of the responsibilities which exist; at least, until the arrival of the Ministry's Staff.

If I may be allowed another paragraph, I would add (after a long period of experience in the field) that the disease is a hard master, and unless every precaution is taken with regard to personal disinfection, it may never let you off; but, on the other hand, if the necessary precautions are carried out in a thorough and efficient manner it will rarely, if ever, let you down.

Truly, your labours may not be recognised in the form of adequate remuneration, or even appreciation. Experience has not infrequently witnessed how thankless a task it may be to do one's duty well. On the other hand, there will be the satisfaction to know that it has been done conscientiously, and to the best of one's ability, to have aimed high even if the results have fallen somewhat short, to have prevented someone's stock from becoming affected by the disease, and to have helped another without reward—it may be without recognition—or even at the cost of some personal inconvenience, loss, and sacrifice. It is worth the risk.

PECULIAR PROBLEMS OF FOOT-AND-MOUTH DISEASE.

By E. PEACEY, F.R.C.V.S.,

Ministry of Agriculture.

The popular opinion that foot-and-mouth disease is an infectious complaint has, unfortunately, been too justified by the colossal number of outbreaks and the tremendous ravages that have occurred during the present epidemic. In many areas infection has spread like a storm, taking everything before it for miles. In some districts there are very few farms that have escaped within a radius of several miles. As is well known, the organism has not been isolated, and until it has been demonstrated or the virus artifically cultivated, we are, in a sense, groping in the dark to find an essential factor that will pave the way to the greatest of all boons, namely, protective inoculation.

The general precautionary measures to prevent the direct spread through human agency can be, and are, frequently carried out with successful results. As aids in these it has been the practice to wear

rubber overall clothing, consisting of cap, coat and rubber boots. With the knowledge that the virus is easily destroyed by chemical disinfectants, the waterproof clothes should be liberally sponged with a solution of any of the well-known coal tar disinfectants. In addition it will be realised that the hands should be scrupulously washed and disinfected. Adopting these measures, it may be generally regarded as a reliable means of eliminating the risks of transmitting infection by persons called in, handling, or coming in contact with infected animals.

I have in mind a case of an outbreak where the milker went direct from his own infected herd, just across the road, to assist in the milking of a neighbour's cattle, and the latter remained healthy. The only precaution the milker took was to wash his hands and change an apron he wore to protect his clothes whilst milking. This is cited not as example of measures to take, but to serve to show that in some instances elementary precautions or preliminary washings have been known to be effective as a means of preventing infection being carried. At other times the disease spreads independently of all local measures put into operation, and if by chance a practitioner did not adopt extreme care he might visit premises and be credited as a medium of carrying infection. To obviate this argument, which is very freely quoted, it behoves a practitioner in a district where foot-and-mouth disease exists to disarm adverse criticism by taking the precautions advocated (always before leaving the premises and preferably under the nose of some person who may act as useful and even honest critic). It will be realised that if it is necessary for us to take preventive steps of this character, it is equally essential for other persons to take similar care, and one cannot hope to obtain anything of this sort from farmers, their employees, dealers and tradesmen. It will, therefore, become self-evident that the dangers and difficulties of keeping infection from being scattered are not only immense but practically limitless.

DIAGNOSES—*Symptoms.*—These are variable in cattle; but wherever lameness exists among animals, or if it attacks several at the same time, it should be treated with extreme suspicion, notwithstanding the complete absence of visible lesions either in the mouth or on the feet—"WATCH AND WAIT"—and the case will prove itself in a few days. This peculiar situation will be rendered more grave if there is a rise in temperature; and the higher the temperature the greater the probability of definite evidence in a day or two. For example, temperatures 102·5°, 103° and 105° might be regarded as suspicious. In the majority of cases, in the absence of lesions, but not always, there is a pronounced rise in temperature, and the tendency is as soon as the vesicles rupture for the temperature, to drop a little.

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It is often probable one may miss the opportunity of recording the rise in temperature. Other suspicious symptoms are loss of appetite, shaking the leg similar to a cat walking over a wet surface, uneasiness and paddling of the feet, or holding the leg in the air as though it was painful, not knowing what to do with the foot in order to rest it. In the early stages of the disease rumination is not a guiding factor, for I have seen animals with well-developed lesions on the tongue chewing the cud, and if at rest it is quite easy to mistake or pass an animal as being free from foot-and-mouth disease. Smacking or kissing of the lips is almost a diagnostic factor when combined with other symptoms, but beware of smacking from other occasional diseases or injuries to the tongue, actinomycosis, etc. In milking cows the symptoms are usually ushered in with a decrease in the supply of milk. Twitching of the lips is also a frequent symptom, and there is the common prevalent one of discharging saliva from the mouth in varying degrees. In calves or yearling cattle it may be a mere bubble and simulate teething troubles; in dairy cattle it is often excessive and in bulls it is frequently profuse.

LESIONS.—Vary in size and shape on the tongue. In the early stages they form distinct vesicles, some of the most typical being as big as a hazel nut and others as big as a walnut. When ruptured, a yellow-tinged serous-like liquid or inflammatory exudate escapes. This is considered the most potent source of the dangerous virus. The ruptured vesicle leaves a raw, red base, which quickly heals, and in the course of two or three days it presents an appearance that might lead one to think that the disease had been in existence for a week.

The dental pad lesion varies in size. It may co-exist with lesions on the tongue, or it may be the sole lesion in the oral cavity. The favourite position is the external angular margin. The semilunar shape of the affected patch being most frequently like one of the small sections or quarter of a Tangerine orange on each corner side of the pad. Of course, one side may coalesce with the other and produce one continuous area. Again, when the vesicle is ruptured a distinct raw, red surface is visible. The pharanyx occasionally reveals small red areas indicating broken vesicles.

With reference to the lesion on the tongue, it will be realised that it is the upper surface that is usually affected, and also in the majority of instances the tip of the tongue is involved. Beware of lozenge-shaped lesions on the side of the tongue, generally due to mechanical injury, instead of the raw red surface associated with foot-and-mouth lesions; they usually present a leathery or necrotic surface.

TEATS.—These occasionally reveal distinct vesicles, sometimes

as large as a walnut, and resemble a bubble covered over with brown tissue paper. When ruptured, fluid escapes, and leaves a raw, red surface.

FEET.—The most typical lesion is a vesicle on the upper and inner surface of the bulb of the heel, which can easily be ruptured, and readily admits of the point of the small finger being inserted. Between the claws the interdigital membrane is easily broken, particularly towards the front of the foot, leaving a red base.

In the early stages of foot-and-mouth disease the practitioner may be called in and find only one animal showing suspicious lesions. If this is limited either to the mouth or foot, and not both, do not be in a hurry to declare unless there is a previous knowledge of exposure to infection, or knowledge that disease is in the immediate locality. Always, however, warn the attendants and isolate the animal. If it is foot-and-mouth disease and the cow one of many, in the same byre under the same roof, it will, in the majority of cases, spread to other animals. But a case has occurred where an infected animal was kept in a stable, and many other cows—within ten yards—outside the limits of the stable, with separate entrance and separate roof, escaped. This represents one of the mysteries of foot-and-mouth disease. I also remember one outbreak where about fifty sheep and three heifers were pastured in a field; twenty-five of the sheep developed foot-and-mouth disease also the three cattle. The main sheds contained the dairy herd, and although the wall of the shed was the boundary to the field, the animals within the shed remained healthy. Another peculiar mystery occurred in an oblong building which was divided into two parts. One part was fitted with stalls for seven cows and the other part was a loose box containing twenty-seven pigs. There was a low wall four feet high between the cows and the pigs. The seven cattle contracted foot-and-mouth disease and saliva dribbled freely from the mouths of the affected animals directly over the low partition wall into the loose box containing the twenty-seven pigs. These twenty-seven pigs never developed foot-and-mouth, nor showed any symptoms suggestive of the disease. They have continued healthy, six weeks having elapsed since the cattle were first affected. Yet fifty yards away another lot of pigs contracted the disease and developed a severe attack of foot-and-mouth disease from which they had not completely recovered a month later. They were exceedingly lame, due to the claws of the feet being in the process of becoming detached. The appearance of the old claws resembled thimbles put on to protect and cover the underlying sensitive structures.

In another outbreak pigs within ten yards of cow-sheds containing

diseased cattle also remained healthy, and were fed by the persons that looked after the diseased animals. The pigs received milk which had been sterilised by boiling, and did not develop foot-and-mouth disease. They made strong, healthy, satisfactory progress.

One of the strange features of foot-and-mouth disease is that it frequently shows a tendency to break out in a most erratic manner. Sometimes when an outbreak occurs there will be a mysterious appearance of the disease five miles, or even twenty miles or more away, without any clue as to the source of origin of infection. In such instances, if it arose from the original outbreak, it would have to pass over a large number of susceptible animals. How it does so is a mystery, but we have noticed that the trend of infection oftens follows the line of the prevailing wind. Smoke from the fires of cremating pits has frequently been blamed locally as a cause in the spread of infection, but I think it may be fairly deduced that the smoke only serves to show which way the wind is blowing, and may be regarded as a coincidental factor. That there are other mysterious agents at work I have no doubt, but there is a common factor I believe, and the only prevailing and general one that fits in with this theory is wind or air borne, and this appears to have a real bearing on the probable solution of the spread of infection. If smoke is a factor, then it must be recalled that during the past twenty-five years diseased animals have nearly always been destroyed by cremation without producing a chain of outbreaks following in the wake of the smoke cloud ; therefore the argument in favour of smoke becomes illogical.

Mild Attacks.—I am inclined to think that some animals (particularly young ones) pass through a mild attack without symptoms being noticed, for it has been observed that calves and yearlings do better and suffer less during isolation than other animals ; that is, they take it in a milder form and the recovery is more rapid and complete. At the end of three weeks it is sometimes impossible to judge from general appearance that the herd had gone through an attack of foot-and-mouth disease, the mouth being normal and the feet free from lesion. A clue may exist in some cases due to the fact that there is a line of demarcation between the old horn and the new horn which is forming, but this is only evident in animals that have suffered severely in the feet, and in young cattle it is practically non-existent.

The question of foot-and-mouth disease is a big subject, it bristles with difficulties. Much can be written, much remains to be done, and many problems remain to be solved. But from recent experience I believe animals are at their highest stage of infectivity in the early

stages of the disease, even before typical lesions of the disease have become evident.

Outbreaks have been dealt with by rational, sanitary measures. the efficiency of which has been established for many years and the success of the operations has been well justified in our position to-day. No doubt in the future we shall be more troubled than in the past owing to modern facilities of transport, increased intercommunication between parts of the Continent of Europe, where disease may be said to be practically existent all the year round, consequently adding risks to the stock of this country.

Clinical Articles

RHODODENDRON POISONING.

By R. HUDSON, F.R.C.V.S.,
Retford.

A FLOCK of sheep were removed from turnips, on which they had been folded, into a park in which stood a residence surrounded by rhododendron shrubs and railed off.

It was a common practice to have sheep there, but on this occasion they walked straight to the fence and commenced to pull at the shrubs.

The following morning I was called in and found about twenty unable to rise, slavering, tympanitic, some semiconscious, some in coma. The worst cases were butchered immediately, and later some of the milder ones. A few recovered. Stimulants and Mag. Sulph. were administered to those which could swallow.

Post-mortem examination showed a general venous congestion, but no marked inflammatory condition.

A NOTE ON THE TREATMENT OF MASTITIS IN THE EWE AND GOAT BY INFLATION OF THE UDDER BY AIR.

By J. F. D. TUTT, M.R.C.V.S., F.L.S., F.Z.S.,
Winchester.

THE treatment adopted and which has given very gratifying results is as follows: The affected quarter or quarters is stripped out, and with an ordinary milk-fever air syringe the udder is *moderately* inflated with air, but not to the extent as in milk fever. This is repeated every second day if required. In addition to this, the affected quarters

are frequently stripped out and a liniment of the following composition well rubbed in two or three times a day :—

℞ Liquor Potass Iodide (Willows)	.. ..		℥i.
Liquor Hamamelidis	.. ..		℥iii.
Ol Rapii ..	.. ..	q.s.	℥viii.

JOHNES DISEASE IN THE GOAT.

By A. W. NOEL PILLERS, F.R.C.V.S.,
Liverpool.

THE increasing importance of the goat is causing more attention to be paid to its diseases in this country.

I have examined samples of fæces from numerous goats, in which nematodes or their ova appeared to be so few or of such species that one would hesitate to say that the clinical pictures described were really due to parasites. In quite a number of specimens of fæces, no animal parasites have been detected, although the histories in such cases have been similar to those of cases of parasitic gastro-enteritis.

In the discussion on a paper on Strongylosis in the Goat, by F. H. Stainton (*Veterinary Record*, vol. ii, 1923, No. 51, p. 941), coccidiosis was mentioned, and an impression is left on the mind that there is at least some degree of obscurity with regard to these diseases.

Last year I made a post-mortem examination upon one goat, whose fæces had shown the presence of comparatively few strongyle ova. I felt satisfied that the condition which necessitated its destruction was due to large numbers of *Trichostrongylus instabilis*, a microscopic nematode of known pathogenicity. In a second case, where no ova or coccidia had been found in the fæces, a post-mortem examination conducted about twelve hours after death revealed a slight degree of simple inflammation of the small intestine behind the duodenum. The pathologist who examined the sections could throw no light upon the cause and no parasites were detected.

On looking the subject up, I was very struck with the similarity of the histories in these cases to several passages in Twort and Ingram's Monograph on Johnes disease. The obscurity seemed very like the early accounts with regard to the discovery of the prevalence of Johnes disease in cattle, that is to say, the clinical manifestations and even the post-mortem lesions were known but were attributed to causes other than the bacillus. Soon after Bang's paper at the National Veterinary Medical Association at Liverpool, in 1906, it became clear from records that what had been attributed to parasites and other causes in cattle was Johnes disease. It is quite possible that the same may even come true with regard to the goat. A third

animal became available for examination on July 6, 1923, and the autopsy was kindly carried out by Mr. H. T. Matthews, M.R.C.V.S., B.V.Sc., D.V.H. The subject was an Anglo-Nubian she-goat, about one and a half years old. She was unthrifty as a kid, but there were no definite symptoms until a couple of months before she was destroyed. She weighed about 60 lb., being approximately half the weight of an average eighteen-months-old she-goat of this breed. Before destruction she showed intermittent diarrhœa, symptoms of anæmia and loss of flesh. As other animals in the herd had shown similar symptoms and had resisted veterinary treatment, it was thought advisable to remove her completely from the herd at once. After chloroforming, she was bled. The upper air passages and thyroids were normal. The lungs had a few slightly elevated whitish coloured patches, irregular in shape and about 2 in. in square area. The bronchial lymphatic glands were slightly enlarged. The stomach presented no visible abnormality, and the same is true of the intestines, save that perhaps the small gut was a little thicker than usual. The fæces in the rectum were normal in colour, shape and consistency. There was a fair supply of abdominal fat of good colour. The mesenteric lymphatic glands were œdematous and enlarged, being, on an average, 1 in. long by ½ in. across. The heart, liver, spleen and kidneys appeared to be normal.

Microscopic examination of material for animal parasites in the lung was negative, but the fæces showed an occasional strongyle egg, although no adults could be found. Blood films stained by Jenner's method did not show the presence of abnormal cells. Smears from the lung, liver, spleen and kidney stained by Lœffler's, Gram's and Ziehl-Nielsen's methods were negative. Smears from the mesenteric lymphatic glands stained in the last-named manner showed, in each case, the presence of acid-alcohol fast bacilli indistinguishable from those of Johnes disease. With this result, the previous history and the absence of other lesions, a finding of early Johnes disease seemed justifiable. The following extracts from Twort and Ingram's Monograph lend additional support to this view, and should cause a more detailed examination to be made of the fæces, gut wall and mesenteric glands of goats with diseases of the intestines for acid-fast bacilli. On page 3, in the definition of the disease, they state—

> " and probably goats." Page 9, " on making post-mortem examinations of animals killed from six to twelve months after inoculation with pure cultures, the present authors have been able to recover the bacilli from the deeper layers of the mucous membrane of the intestine; but the thickening of the bowel in some of the cases was scarcely noticeable." Page 22, " but

in naturally infected animals, the period from the time the bacilli begin to multiply in the intestinal mucosa to the onset of diarrhœa is rarely less than six months, and in well-fed animals it may be much longer." Page 28, "In the case examined by McFadyean, Sheather and Edwards, the subject, a Welsh ewe, was suspected of suffering from parasitic gastro-enteritis, and on post-mortem examination, many worms (*Strongylus cervicornis*) were found in the abomasum. The frequency with which sheep and lambs are attacked with parasitic gastro-enteritis and the high mortality often observed, suggest, in such cases, the need for careful post-mortem examinations, as it is easy to overlook slight lesions of Johnes disease, especially in the presence of an apparently obvious cause such as *Strongylus contortus*." Page 29, "In 1911, we inoculated two young goats with pure cultures of Johnes bacillus. Seven months later the animals were apparently in good health except that one of them occasionally showed some slight diarrhœa. No rise of temperature had been noted and their appetites remained normal; yet, on post-mortem examination, both were found to be affected with Johnes disease." Page 49, "In several cases the authors have been able to isolate the bacillus in pure cultures when apparently there were no lesions." McFadyean and Sheather (*Journal of Comparative Pathology and Therapeutics*, vol. xxix, 1916, p. 62) experimentally infected three goats out of three with Johnes disease. They further describe the post-mortem examinations of four naturally occurring cases in goats belonging to the same owner, and say it was diagnosed in others by means of Johnin, but the opportunity to make post-mortems did not occur.

Professor de Blieck of Utrecht informs me that Johnes disease has not been recorded in the goat in Holland.

W. E. Armstrong (VETERINARY JOURNAL, vol. 79, 1923, p. 139) states that he has had satisfactory results in the treatment of Johnes disease in cattle with naphthalene and turpentine in olive oil, given once dailyf or fourteen days, then, after a rest of a week, repeated for a further fourteen days.—*Received January* 31, 1924.

A CASE RESEMBLING GRAVES' DISEASE IN A LEOPARDESS.

By N. S. LUCAS, M.B.,
Pathologist to the Zoological Society of London.

THE following short communication is the result of the appearance in the February number of the VETERINARY JOURNAL of Mr. Pugh's very interesting article on "Graves' Disease and Thyroid Instability

in the Cow." It may be described as the complement of that paper, for the reason that while the diagnosis of Graves' disease in cows has hitherto depended on the resemblance of the clinical picture in the cow to that of man, the diagnosis in the case of the leopardess depends

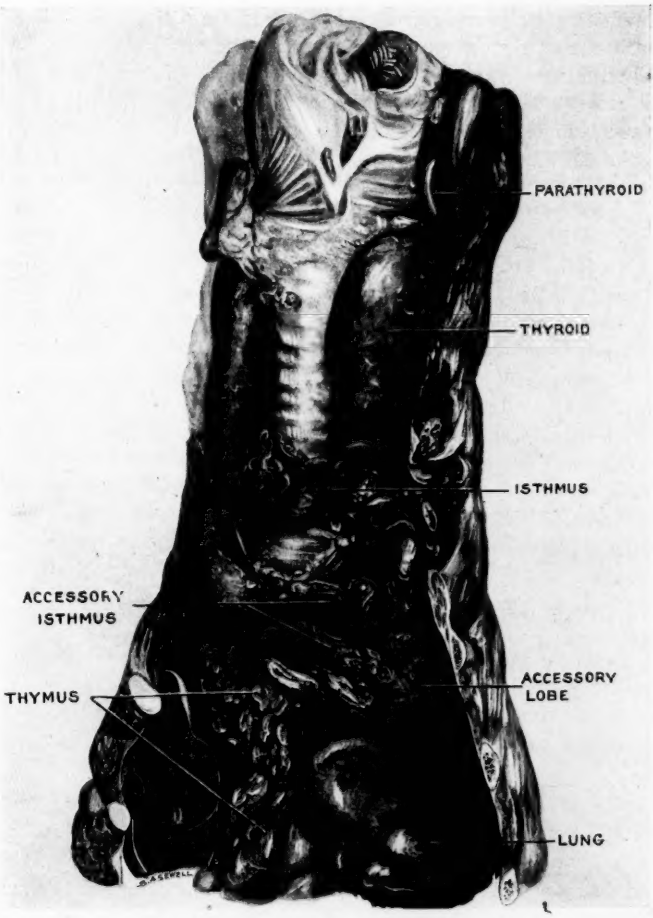

FIG. 1.—Neck of Leopardess, showing Enlarged Thyroid.

entirely upon the post-mortem findings and the microscopic appearance of the thyroid.

The case in question is one of a young adult leopardess, which had been a pet in H.M.S. *Hyacinth*, being presented subsequently

to the Zoological Society. During her life in the Gardens she was remarkable for her playfulness and docility, and this amiability continued even during the period of œstrum, which is not usually the case in these animals. After she had been in the Gardens for three and a half years it was decided to mate her. This was done, and passed off quite peacefully, although it is often a time when signs of ferocity show themselves. The œstrum lasted a fortnight, which is about the usual period in leopards. Three weeks after the œstrum had ceased a tiger in the next den contrived to open the sliding door between his den and that of the leopards. He at once attacked the female and killed her before being driven off by the combined efforts of the male and the keepers.

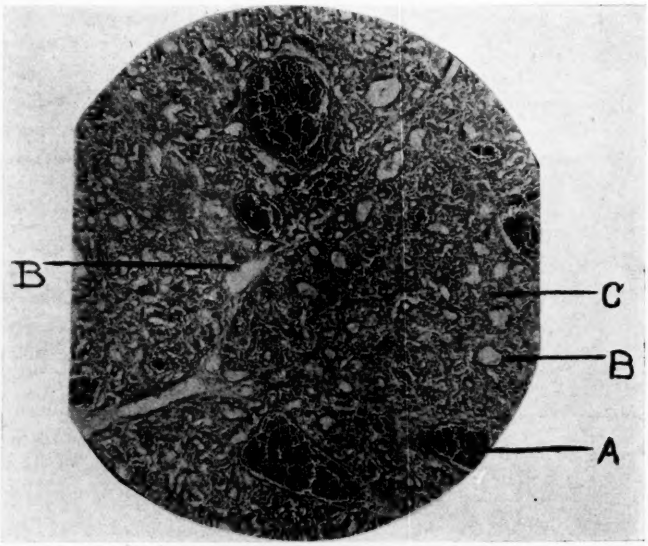

FIG. 2.—(A) Enlarged Bloodvessel; (B) Alveoli Empty of Colloid; (C) Stroma Hypertrophied.

A post-mortem was held, the findings of which were as follows: The animal was in good condition, without being unduly fat. The skull was crushed and the brain lacerated, from which death must have resulted instantaneously. There was a superficial lacerated wound on the right side of the chest.

There was no exophthalmos.

The thyroid was greatly enlarged. The bloodvessels on its surface were numerous and distended. These have been removed in the dissection to show the outlines of the gland. The normal gland in

the leopard consists of two lobes, each about $1\frac{1}{2}$ in. long and $\frac{3}{4}$ in. wide at the widest part. These are connected by a narrow isthmus. Instead of this the measurements of the gland were: Right lobe, 3 in. by 1 in.; left lobe, $2\frac{1}{2}$ in. by $1\frac{1}{4}$ in.; accessory left lobe, $2\frac{1}{4}$ in. by $1\frac{1}{4}$ in.

Of this accessory lobe 2 in. were within the thorax, where its lower end touched the apex of the left lung. The two lobes were connected by an isthmus considerably thicker than normal, while the accessory lobe of the left side was joined to the lower pole of the right lobe by a thick band, which at its right extremity was almost large enough to be considered as an accessory lobe.

Below this band was the thymus, which was large for an animal of the age of the specimen. This enlargement is recorded in human cases of the disease.

The para-thyroids were apparently large, but seen under the microscope they showed nothing abnormal.

The accompanying drawing shows the appearance and relations of the structures concerned.

The lungs were congested. This was probably of agonal origin. The abdominal organs appeared to be perfectly healthy.

A careful examination was made of the uterus and ovaries, owing to the possibility of an early pregnancy. Nothing abnormal was seen. There was no sign of pregnancy.

Under the microscope the vascularity is well shown. The alveoli are mostly small, and contain little or no colloid. The stroma is considerably increased. These appearances are all in keeping with Grave's disease.

Mr. Leslie Pugh, B.Sc., F.R.C.V.S., after seeing the specimen and the section under the microscope, while agreeing that both were diagnostic of Graves' disease, was a little puzzled by the absence of clinical symptoms and signs. Nevertheless, it must be remembered that neither emotional disturbance nor exophthalmos are of universal occurrence in the human. It is true that there were no evidences of gastric disturbance. There is no proof of the presence or absence of tachycardia.

This is not the occasion for a further discussion, but there is a good deal of evidence to show that the lower animals, at all events in captivity, can exhibit a very fair degree of health, when a man similarly affected by a disease would appear almost moribund.

Abstracts of Current Literature

Horvath.—Practical Considerations in Connection with Foot-and-Mouth Disease.—*Allatezeszsejugy*, 1922, No. 4, p. 39.

After the slaughter of two cows affected with aphthous fever which came from a region where the malady had raged in a malignant form, the autopsy revealed an abscess with a thin wall in the myocardium of the left heart at the level of the valves. During life these cows became easily fatigued; there were strong contractions of the heart and very pronounced *bruits*. A short time after the introduction of these animals malignant foot-and-mouth disease appeared amongst the cattle which had been in contact with them.

The infectious power of these purulent foci of the myocardium of bovines which have had aphthous fever three or four months previously has been experimentally demonstrated in two other cases where the buccal mucosa had been rubbed with the pus.

As *preventive treatment* the author recommends the intravenous injection of 80 to 200 cubic centimetres of an aqueous solution of alum in the proportion of 2 to 4 per cent. The solution is sterilised by boiling and cooled to the body temperature. These injections were followed in the first hour by a rise of temperature from ½ to 1 degree, with acceleration of pulse and respiration; in some cases there was an inflammation of the tendon sheaths which lasted twenty-four to forty-eight hours. The 900 animals thus treated remained free from the disease, or the malady was benign and of short duration.

In a cow-house in which the members were in an advanced state of gestation they were all injected at the udder with 120 to 180 or 80 to 160 cubic centimetres of citrated blood provided from a healthy cow that had had the malady. Franz and Geisserts' emetic treatment was also used on fifteen cows in the same batch. It consists in injecting 100 to 200 cubic centimetres into the vein of an aqueous solution of 9 to 10 grammes of salt and 10 grammes of tartar emetic to a litre of water. The animals treated remained healthy, and no cases of abortion ensued.

(Weekly Report of the Ministry of Agriculture and Fisheries, February 7, 1924.)

Lebailly, Ch.—The Duration of the Contagious Period in Foot-and-Mouth Disease.—*Recueil de Médecine Vétérinaire*, August 1922.

Two periods ought to be distinguished in the evolution of aphthous fever. A first insidious period only apparent by a rise of temperature and during which the malady is eminently contagious. A second period, in which marked symptoms are declared, which is very painful, but which does not merit the fear which it inspires, the aphthous animal being no longer contagious at this time.

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These facts explain the non-effectiveness of sanitary measures taken against the disease when the epidemics have already taken on a certain development. Quarantine imposed on healthy animals constitutes the true operative measure.

Meyer.—Foot-and-Mouth Disease in Germany in the years 1920–1921. —*Berliner Tierärtzliche Wochenschrift,* No. 52, 1922.

THE epidemic slipped in from Italy and then from the north to south Germany, and in a short time spread over the whole kingdom. Its outbreak and course was very virulent, and young and old cattle were fatally affected. The malignancy of its course was due to the highly virulent infection which could not be explained. Many of the cattle died of apoplexy through heart paralysis, the heart muscle changes being degenerative and interstitial inflammation. Injections with blood and serum of recovered animals in the author's experience protected against the disease. Healthy cattle inoculated at one and the same time with blood and infected with lymph from fresh vesicles had the malady in an extremely mild form. In feverish animals the ailment was cut short. In animals with clinical appearances there was a quick fall in temperature, and improvement in general condition and a mild attack and no deaths. In young animals a timely injection was favourable in every way. As drugs, trypaflavin and iodine-carbon had a favourable influence on the course of the malady, as well as unspecific immunisation with caseosan and aolan. Experiments with horse blood and normal cattle blood were not conclusive. Loeffler's serum was recognised as quite helpful.—*Schweizer Archiv für Tierheilkunde.*

Gobel.—The Organs, Secretions and Excretions of Sick Animals which contain the Virus of Foot-and-Mouth Disease.—*Zeitschrift für Veterinärkunde.*

DR. GOBEL, of the Bavarian Veterinary Police School, has made close and varied studies on the above question, and comes to the following conclusions :—

1. Before visible primary changes occur at the site of inoculation the virus of foot-and-mouth disease can be proved in the blood. The time of its demonstrable appearance in the blood depends on the virulence of the voided material. Also after the appearance of secondary aphthæ the virus can still be in the blood.

2. With the blood the virus gains access to every organ of the body. It finds little or no possibility of development in the large glands of the body and in the parenchymatous organs such as the liver, kidneys, spleen, brain, and only a small chance in the salivary and milk glands.

3. The virus, during the time it mixes and circulates with the blood, may be excreted by the gall, urine and milk (possibly also, although not proved, by the saliva).

4. In the urine two phases are apparent in the occurrence of the virus. In the one case the virus was provable very early on, and in the other very late, shortly before the occurrence of secondary aphthæ. The view may be taken here that in the first case there was excretion of the virus, and in the second that the shed epithelium of the urinary tract was infected from the blood.

5. The external skin contains the virus before the secondary aphthæ develop at the usual sites. It disappears in the skin, and in the blood a noticeable attenuation occurs. In places badly supplied with blood the virus may increase, although there is a marked decline of it in the whole body. A local increase of secondary aphthæ arises, in which the virus succumbs to the injurious effect of anti-bodies.

Review

Practical Morbid Histology. A Handbook for the Use of Students and Practitioners. By ROBERT DONALDSON, M.A., M.D., Ch.B. (Edin.), F.R.C.S.E., D.P.H., Lecturer in Pathology and in Forensic Medicine St. George's Hospital Medical School (University of London); Pathologist and Curator of Museum, St. George's Hospital, London, etc. With Foreword by Sir Humphrey Rolleston, K.C.B., M.D., President Royal College of Physicians. Messrs. William Heinemann (Medical Books), Ltd., London. Price 15s.

The author of this unillustrated work of approximately 350 pages says in his preface: "This small volume has been written in response to numerous requests for a convenient handbook for laboratory purposes, and is intended for students beginning the study of morbid histology, as well as for practitioners who in order to present themselves for one of the higher examinations desire to refurbish their knowledge of the subject."

Judged from this point of view, the work has achieved its goal very successfully. Each pathological condition is introduced by the recital of a sufficient number of causes, and a short enough account of the morbid anatomy to make the morbid histology clear to the reader. Furnished with a box of slides of the common pathological conditions and this work, the student should be able to obtain a sound grasp of the subject.

About thirty-five pages are devoted to histological methods. Of two appendices, the first deals with the formulæ of stains, and the second gives in tabular form an account of the common helminths and their ova, which may be found in man. The author has been somewhat unfortunate in the choice of his terms on page 347, where he heads a paragraph: Cysticercus Stage of *Trichina spiralis*. Although the generic value of the word cysticercus is now abandoned, it still has a definite place in cestode terminology. The book is light, the publishers' part is well done, and although essentially a medical work, should find at least some readers amongst veterinarians.

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Correspondence

THE INDIAN VETERINARY SERVICE.

To the Editor of the VETERINARY JOURNAL.

SIR,—

I regret to note that in your attempt to safeguard the interests of the members of the Royal College of Veterinary Surgeons entering the Indian Veterinary Service, you went out of your way to criticise a Government of India policy, and indirectly did a disservice to a class of veterinary officers in India (*vide* VETERINARY JOURNAL, December 1923).

You assert that no examination test was demanded of the Provincial Officers selected by the Government of India for training either before or after their training. But you admit that these officers are all graduates of the veterinary colleges in India. The fact of the matter is, these officers were recommended as suitable for promotion by their respective local Governments based on the opinions of senior officers of the Veterinary Department, themselves M.R.C.V.S.'s. You should be prepared to admit that the questionable test of an examination of a few hours' duration by an unknown examiner or examiners is a far inferior test to gauge a candidate's real merit than long association as colleagues in the performance of duties pertaining to the activities of the Veterinary Department in India.

Your next contention is that the nature of training, or rather the curriculum of studies prescribed for these candidates, are unknown to you, so that you cannot comment on them. An inquiry from the Director of the Imperial Bacteriological Laboratory, Muktesar, India, would have brought you the necessary information.

Professor J. T. Edwards, late of the Royal College of Veterinary Surgeons of London, who directed this course, is assisted by two others, Messrs. Bennett and Cooper, also late of the teaching staff of the Royal College of Veterinary Surgeons of London, with Mr. Timoney, an equally efficient teacher. I may state for your information that the subjects comprised all that is required to be known by a first-class Veterinary Surgeon, or rather far more than what is available during a six-months' course of so-called Post-Graduate Studies in England, and the facilities available at the Muktesar Institute are perhaps more than what could be had with a combination of the Veterinary Post-Graduate Institutions in Great Britain. Then, again, the professors, by their constant association for eighteen months with these Provincial Officers, are in a better position to report on the abilities of these candidates than an outside Examining Board, say, like Liverpool, where any of these candidates could easily have taken the D.V.H. diploma within a six-months' sojourn.

Your contention is that the future entrants to the I.V.S. would feel shy to enter the service in view of their having to serve men with " inferior " qualifications. The direct reply to this is, the illuminating evidence of Mr. F. A. Slocock, a brilliant member of the Indian Civil Service, before the Lee Commission now sitting in India, in which he said that it still remains an anomaly as to why an Indian Minister (a non-official) controlling several transferred departments, with any number of high-class technical men under him, is considered efficient, while the efficiency of tried public

servants of several years' standing, with the weight of experience of local conditions to their credit (as these Provincial Officers are), is questioned.

It therefore comes to this, that according to you anything but a M.R.C.V.S. " Hall-mark " is an inferior qualification. Would you apply this criterion in Canada, South Africa, or Australia ?—all British dependencies where locally qualified veterinary surgeons are available. It is true that in India a three-years' training was considered sufficient till recently to qualify as a graduate from any of these veterinary colleges. Are not some of the brilliant men of the profession in England at present three-years' men ?

I may be permitted to carry my anomaly a bit further. It will be found in India, at any rate, that the so-called " inferior " qualified men occupy " superior " positions in every branch of service under the Crown, including the I.C.S., yet the cry of inferiority is not raised by any of the junior members thereof, not even by the member of the Administrative Service as the I.C.S.

Is it necessary for me to suggest the reason why ?

It is a fact that this ostracism practised by the members of the R.C.V.S. against qualified Indians is a monopoly of the Veterinary, and no other service. In the sister services of Agriculture, Forestry, Engineering and Medical, Indians are freely admitted to the Imperial arena without frown or favour, efficiency being the only test. The scientific brotherhood which every scientist ought to imbibe as part and parcel of his training by the M.R.C.V.S.'s is tarnished by motives which should be characterised as deplorable. The sooner the members of the I.V.S. throw off this cloak of exclusion the sooner they will take their right place in the hearts of their Indian brethren, and in the estimation of the world at large.

Yours faithfully,

G. N. Roy Chandhuri,

Hon. Sec. Bengal Veterinary Association.

117, Dhurrumtolla Street, Calcutta,
February 7, 1924.

NOTICES

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